

What is Claimed Is:

- Sub A!* → 1. An apparatus for performing dip coating of a layer of a resist material on at least one surface of a substrate, comprising:
- 5 a dip coating vessel having an interior space adapted for containing therein a liquid for said dip coating, said dip coating liquid comprising a solution of said resist material in a solvent, said dip coating vessel being open at the top thereof;
- a substrate mounting means for introducing into and withdrawing a substrate from said interior space of said dip coating vessel *via* said open top; and
- 10 a viscosity control system for monitoring and maintaining the viscosity of a dip coating liquid supplied to said dip coating vessel at a predetermined value.
2. The apparatus as in claim 1, wherein:
- said viscosity control system includes a recirculation loop for continuously or periodically recirculating said dip coating liquid in said dip coating vessel.
3. The apparatus as in claim 2, wherein:
- said recirculation loop includes a reservoir for said dip coating liquid, with an inlet conduit connected between said reservoir and said dip coating vessel for supplying dip coating liquid from said reservoir to said dip coating
- 5 vessel, and an outlet conduit connected between said dip coating vessel and said reservoir for returning dip coating liquid from said dip coating vessel to said reservoir.
4. The apparatus as in claim 3, wherein:
- said recirculation loop provides periodic recirculation of said dip coating liquid in said dip coating vessel and comprises a bypass conduit for

periodically diverting, thus interrupting, flow of said dip coating liquid
5 between said reservoir and said dip coating vessel.

5. The apparatus as in claim 4, wherein:

said recirculation loop provides recirculation of said dip coating liquid
in said dip coating vessel only when a substrate is immersed in said dip
coating liquid in said dip coating vessel and includes a pair of 3-way flow
5 control valves for flowing said dip coating liquid through said bypass conduit
in response to a signal provided by said substrate mounting means.

6. The apparatus as in claim 3, wherein:

said recirculation loop further includes a pump connected to said inlet
conduit for recirculating said dip coating liquid.

7. The apparatus as in claim 3, wherein:

said recirculation loop further includes a filter connected to said inlet
conduit for removing particulate matter from said dip coating liquid.

8. The apparatus as in claim 3, wherein:

said recirculation loop includes a viscosity measuring device for
continuously measuring the viscosity of said dip coating liquid in said
reservoir and a solvent dispensing system for supplying said solvent for said
5 resist material to said reservoir in response to the measured viscosity.

9. The apparatus as in claim 8, wherein:

said solvent dispensing system includes a tank for containing said
solvent and a conduit between said solvent tank and said reservoir for
supplying a flow of solvent from said solvent tank to said reservoir.

10. The apparatus as in claim 9, wherein:

said solvent dispensing system further includes a valve for controlling
the flow of solvent in said conduit between said solvent tank and said
reservoir, and valve flow control means responsive to the measured viscosity
5 for controlling said solvent flow and thereby maintaining said predetermined

viscosity of said dip coating liquid in said reservoir and in said dip coating vessel.

11. The apparatus as in claim 8, wherein:

said reservoir further includes agitator means for uniformly mixing solvent supplied by said solvent dispensing system with said dip coating liquid in said reservoir.

12. The apparatus as in claim 1, wherein:

said substrate mounting means includes means for vertically mounting a disk-shaped substrate comprising a pair of oppositely facing major surfaces to be simultaneously dip coated, and means for rotating said disk-shaped substrate about a central axis.

13. A method of performing dip coating of a layer of a resist material on a surface of a substrate, comprising steps of:

(a) providing a dip coating vessel having an interior space containing therein a liquid for said dip coating, said dip coating liquid comprising a solution of said resist material in a solvent, said dip coating vessel being open at the top thereof;

(b) providing a substrate having a surface, immersing said substrate in said dip coating liquid in said dip coating vessel *via* said open top, and withdrawing said substrate from said dip coating vessel *via* said open top, thereby forming a layer of said resist material on said surface of said substrate; and

(c) monitoring and maintaining the viscosity of said dip coating liquid supplied to said dip coating vessel at a predetermined value.

14. The method according to claim 13, wherein:

step (b) comprises providing and immersing a vertically oriented, disk-shaped substrate having a pair of opposed major surfaces while rotating said disk-shaped substrate about a central axis, thereby simultaneously forming a layer of said photoresist material on each of said pair of surfaces; and

step (c) comprises providing a viscosity control system including a recirculation loop for continuously or periodically recirculating said dip coating liquid in said dip coating vessel.

15. The method according to claim 14, wherein:

step (c) comprises providing a recirculation loop including a reservoir for said dip coating liquid, with an inlet conduit connected between said reservoir and said dip coating vessel for supplying dip coating liquid from said reservoir to said dip coating vessel, and an outlet conduit connected between
5 said dip coating vessel and said reservoir for returning dip coating liquid from said dip coating vessel to said reservoir.

16. The method according to claim 15, wherein:

step (c) comprises providing a recirculation loop for periodically recirculating said dip coating liquid in said dip coating vessel, said recirculation loop comprising a bypass conduit for periodically diverting, thus
5 interrupting, flow of said dip coating liquid between said reservoir and said dip coating vessel.

17. The method according to claim 16, wherein:

step (c) comprises providing a recirculation loop for recirculating said dip coating liquid in said dip coating vessel only when a substrate is immersed in said dip coating liquid in said dip coating vessel, and said recirculation loop
5 includes a pair of 3-way flow control valves for flowing said dip coating liquid through said bypass conduit in response to a signal provided by said substrate mounting means.

18. The method according to claim 15, wherein:

step (c) further comprises providing a recirculation loop including a pump connected to said inlet conduit for recirculating said dip coating liquid and a filter connected to said inlet conduit for removing particulate matter
5 from said dip coating liquid.

19. The method according to claim 15, wherein:

step (c) further comprises providing a recirculation loop including a device for continuously measuring the viscosity of said dip coating liquid in said reservoir and a solvent dispensing system for supplying said solvent for
 5 said resist material to said reservoir in response to the measured viscosity.

20. The method according to claim 19, wherein:

step (c) comprises providing a solvent dispensing system including a tank for containing said solvent and a conduit between said solvent tank and said reservoir for supplying a flow of solvent from said solvent tank to said
 5 reservoir.

21. The method according to claim 20, wherein:

step (c) includes providing a solvent dispensing system which further comprises a valve for controlling the flow of solvent in said conduit between said solvent tank and said reservoir, and valve flow control means responsive
 5 to the measured viscosity for controlling said solvent flow and thereby maintaining said predetermined viscosity of said dip coating liquid in said reservoir and in said dip coating vessel.

22. The method according to claim 19, wherein:

step (c) further comprises providing said reservoir with agitator means for uniformly mixing solvent supplied by said solvent dispensing system with said dip coating liquid in said reservoir.

23. The method according to claim 14, wherein:

step (b) comprises providing a disk-shaped substrate for a hard disk magnetic or magneto-optical (MO) recording medium and said resist material is a photoresist.

~~24.~~ An apparatus for performing dip coating of a layer of a resist material on at least one surface of a substrate, comprising:

an open cup dip coating vessel having an interior space for containing therein a liquid for said dip coating; and

5 means for monitoring and maintaining the viscosity of said dip coating liquid supplied to said dip coating vessel at a predetermined value.

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